REMARKS

Amendments to the Specification

Paragraph No. **0015** has been amended to correct an inadvertent typographical error. The correct word "of" has been substituted for the incorrect word "is."

Paragraph No. **0041** has been amended to incorporate disclosure contained within Provisional Patent Application No. 60/475,145 to which the present patent application claims priority and which was incorporated by reference in Paragraph No. **0001**. The disclosure being incorporated into the present Specification can be found in the provisional patent application at pages 14-15.

Amendments to Claims 1, 3-5, 12, 14-15, and 27 and New Claims 28-38

Claims 1 and 12 have been amended to more particularly point out and distinctly claim the subject matter of the invention by indicating that the portion of the substrate and the purified purge gas are contacted at a temperature of about 20°C to about 100°C. Support for these conditions is provided in Amended Paragraph Nos. **0041** and **0067**, the Examples, and Paragraph No. **0056**, Table 2. Under these conditions, the AMC does not decompose.

In addition, Claims 1 and 12 have been amended to more particularly point out and distinctly claim the subject matter of the invention by indicating that the purified purge gas has a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons. Support for these amendments is provided in Paragraph Nos. **0006, 0008, 0013,** and **0067**.

Claims 3-5 and 14-15 have been amended to provide proper reference to antecedents in amended Claims 1 and 12. Support for the amendments can be found in the Paragraph Nos. **0006, 0008, 0013, 0042** and in the Claims as originally filed.

Claim 27 has been amended to more particularly point out and distinctly claim the subject matter of the invention by indicating that the purge process is performed under temperature that does not change the AMC. Support for this amendment is provided in Amended Paragraph No. **0041**, the Examples, and Paragraph Nos. **0013-0015**.

In addition, Claim 27 has been amended to more particularly point out and distinctly claim the subject matter of the invention by indicating that the purified purge gas has a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons. Support for this amendment is provided in Paragraph Nos. **0006**, **0008**, **0013**, and **0067**.

New dependent Claims 28-31 have been added to further specify the temperature at which the portion of the substrate and the purified purge gas are contacted. Support for these new claims is provided in Amended Paragraph No. **0041.**

New independent Claim 32 is directed to a method for the removal of airborne molecular contaminants (AMC) from a AMC contaminated substrate. Support for new Claim 32 is provided in Paragraph Nos. **0013**, **0014**, and **0042**, and in Amended Paragraph No. **0041.**

New Claims 33, 34, and 35 are dependent on new Claim 32. Support for these new claims is provided in Paragraph Nos. **0013**, **0014**, **0038**, **0040**, and **0042**, in Amended Paragraph No. **0041**, and in the Examples.

New Claims 36-38 are directed to a method for the removal of airborne molecular contaminants (AMC) from a wafer processing or storage chamber. Support for new Claims 36-38 is provided in Paragraph Nos. **0013**, **0014**, **0038**, **0040**, **0042**, and **0067**, in Amended Paragraph No. **0041**, and in the Examples.

Applicants respectfully submit that the application is now in condition for allowance. In further support of the application, Applicants set forth below responses to the Examiner's comments made in the Final Office Action mailed from the Patent and Trademark Office on January 20, 2006.

Rejection Under 35 U.S.C. §112, First Paragraph

Claims 1-5, 8-15, and 18-26 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. As set forth above, Applicants have amended independent Claims 1 and 12. Applicants have also amended the Specification to incorporate disclosure contained within the provisional patent application to which the present application claims priority. In light of these amendments, the claims meet the requirements of 35 U.S.C. §112, first paragraph.

Rejection Under 35 U.S.C. §112, Second Paragraph

Claim 27 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Applicants have amended Claim 27 to indicate that the portion of the wafer and the purified purge gas are contacted under temperature that does not change the AMC. Applicants submit that amended Claim 27 meets the requirements of 35 U.S.C. §112, second paragraph.

Patentability of Claim 27 over Somekh

Independent Claim 27 was rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,427,703 issued to Somekh (hereinafter, "Somekh").

Amended Claim 27 is patentable over Somekh. For example, Somekh does not teach: (1) "contacting at least a portion of the wafer with the purified purge gas under temperature that does not change the AMC"; or (2) "producing a contaminated purge gas by *transferring* AMC from the wafer into the purified purge gas" (emphasis added), as stated in Amended Claim 27.

Somekh is directed to a process wherein carbon deposits are removed from equipment by reacting the carbon deposits to form a volatile gas species. (*See* Somekh col. 3, lines 13-45.) Somekh discloses transforming the surface carbon deposits into a different chemical entity. The Somekh process requires that the oxidizer contain sufficient energy to permit the chemical transformation of the carbon deposits into volatile gas species. For example, Somekh discloses using high energy, such as thermal activation, microwave activation, plasma discharge, and ozone activation. (*See* col. 6, lines 38- 45). Thus, Somekh does not teach contacting at least a portion of the wafer with a purified purge gas under temperature that does not change an AMC.

In addition, Somekh does not teach transferring an AMC from a wafer into a purified purge gas. Instead, Somekh discloses *chemically transforming* carbon deposits into different gaseous chemical entities (*i.e.*, CO or CO_2) and subsequently removing the different gaseous entities. (*See* Somekh col. 5, lines 33-40.) In contrast to the Somekh process, Claim 27 states that a contaminated purge gas is produced by *transferring* the AMC from the wafer into the purified purge gas.

In the Office Action of January 20, 2006, the Examiner states that "transferring" according to Webster's dictionary means to "carry or remove" and Somekh teaches removal of contaminants from the substrate surface. However, the dictionary definition of "transfer" is not determinative of either (1) the meaning of the term "remove" as used in the Somekh disclosure or (2) the meaning of the term "transferring" in the pending patent claims. During patent examination, the pending claims must be "given their broadest reasonable interpretation *consistent with the specification.*" *In re Hyatt*, 211 F.3d 1367, 1372, (Fed. Cir. 2000) (emphasis added). The meaning of the claim terms must be read in light of the Specification. *See Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) ("We cannot look at the ordinary meaning of the term ... in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history." quoting *DeMarini Sports, Inc. v. Worth,* 239 F.3d 1314, 1324 (Fed. Cir. 2001).)

Taken in context of Applicant's disclosure, the word "transferring," as the Applicants have used the word consistently in their Specification and in their Claims, refers to transferring, or moving, contaminant species from a surface to a purge gas. As used by Applicants, "transferring" is not synonymous with the word "remove" as that word is used by Somekh. Somekh "removes" carbon deposits by reacting them to form volatile gases. The present invention does not "remove" AMC by reacting them to form different chemical entities, the present invention involves "transferring," or moving, an AMC from a surface to a purge gas. For example, at Paragraph No. **0039**, Applicants state that the contaminants *diffuse* into the purge gas and, in Paragraph No. **0040**, Applicants state that contaminant species are *desorbed.* Neither of these descriptions of the invention indicates that the contaminants are "removed" via chemical reaction and a subsequent transport of the reaction products, as is disclosed by Somekh. Instead, both descriptions are consistent with the Applicants' intended meaning of the word "transferring." In ascertaining the meaning of the word "transferring," this context of the

Specification cannot be ignored. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005).

Furthermore, the temperatures disclosed in Amended Paragraph No. **0041** are temperatures at which airborne molecular contaminants would be transferred, or moved, from a surface into a purge gas as opposed to being chemically transformed into different volatile gas species such as CO and CO_2 as Somekh does.

In view of the above remarks, Applicants respectfully submit that Claim 27 is patentable over Somekh.

Patentability of the Claims over Somekh, alone or in Combination with Other Cited References

Claims 1-5, 8-15, and 18-27 were variously rejected under 35 U.S.C. 103(a) as being unpatentable over Somekh in view of U.S. Patent Nos. 6,610,123 issued to Wu, *et al.* (hereinafter, "Wu"); 6,724,460 issued to Van Schaik, *et al.* (hereinafter, "Van Schaik"); 6,391,090 issued to Alvarez Jr., *et al.* (hereinafter, "Alvarez"); and 6,638,341 issued to Spiegelman, *et al.* (hereinafter, "Spiegelman").

None of the combinations of cited references renders obvious Applicants' claimed invention. All rejections rely upon Somekh as the primary reference. Each of the rejections of Claims 1-5, 8-15, and 18-26 primarily rely upon a combination of Somekh with Wu.

As stated above, Applicants have amended Claims 1, 12, and 27 and added new Claims 28-36.

Somekh does not teach or suggest "contacting at least a portion of the substrate with the purified purge gas at a temperature of about 20°C to about 100°C" as stated in amended independent Claims 1 and 12. As discussed above, the Somekh process requires the process gas to contain sufficient energy to permit the chemical transformation of the carbon deposits into a volatile gas species and therefore Somekh discloses using high energy, such as thermal activation, microwave activation, plasma discharge, and ozone activation. As generally discussed above, Somekh also does not teach "producing a contaminated purge gas by *transferring* AMC from the substrate into the purified purge gas" (emphasis added), as stated in amended independent Claims 1 and 12. As used by Applicants, "transferring" is not synonymous with the word "removing" as that word is used by Somekh. Somekh "removes" carbon deposits by reacting them to form volatile gases. The present invention does not "remove" AMC by reacting them to form different chemical entities, the present invention involves "transferring" AMC from a substrate to a purge gas. Furthermore, Somekh does not teach or suggest that the purified purge gas has a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons.

Wu does not remedy the deficiencies of Somekh. Like Somekh, Wu does not teach or suggest using a purified purge gas having a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons. Wu does not appreciate the advantages to be gained from using a purified purge gas wherein the purge gas comprises oxygen and has a contaminant concentration of less than about 1 ppb of these contaminants. For example, Wu does not teach or suggest the effectiveness in transferring AMC that practice of the present invention provides. Wu's lack of appreciation for using a purified purge gas wherein the purge gas comprises oxygen and has a contaminant concentration of less than about 1 ppb of the specified contaminants and the resulting effectiveness in transferring AMC is significant as manufacturers of wafers and chips have been engaged in extensive and continual efforts to improve upon the cleanliness of their fabrication facilities and the purity of process materials and gases. *See* Specification at Paragraph **0004.** The present invention provides a method to achieve the increasingly stringent needs of wafer and chip manufacturers, while Wu does not teach or suggest the present invention's effectiveness in removing AMC.

In addition to not disclosing that the purge gas must have a contaminant concentration of less than about 1 ppb of the specified contaminants, there are no statements in Wu that the disclosed methods for purifying gases contained therein are even capable of providing such a level of purity.

Wu discloses using a purge gas to sweep contaminants away from a photolithography mask. Wu does not teach or suggest a method for the removal of AMC from a wafer or from a wafer processing or storage chamber as claimed in Claims 27, 33, 34, and 36-38.

Furthermore, like Somekh, Wu does not teach or suggest "contacting at least a portion of the substrate with the purified purge gas at a temperature of about 20°C to about 100°C" as stated in amended Claims 1 and 12. Wu does not state the specific temperature to which "the ambient the temperature in the vicinity of the mask **240** in the stepper" refers.

Since Wu does not cure the deficiencies of Somekh, the combination of the teachings does not render the presently claimed invention obvious.

Furthermore, there is no motivation to combine Somekh and Wu. Somekh is directed to a method for chemically transforming surface carbon deposits into volatile gas species. Wu discloses using a purge gas to sweep contaminants away from a photolithography mask. Wu does not teach or suggest chemical transformation of the contaminants. Somekh states that its method of chemically transforming carbon deposits into volatile gases is an alternative to the expensive and time consuming method of reducing carbon contamination by ensuring that exclusively non-carbon materials are used in the imaging chamber (much like the Wu process of sweeping contaminants away from the mask). (*See e.g.*, Somekh at col. 2, line 64 through col. 3, line 10.) Since the method described by Somekh is an alternative to the method described by Wu, one of ordinary skill in the art would not be motivated to combine the teachings of the references.[1]

Further, even if the teachings were to be combined, since Somekh requires the process gas to contain sufficient energy to permit the chemical transformation of the carbon deposits into a volatile gas species (using high energy such as thermal activation, microwave activation, plasma discharge, and ozone activation), and Wu does not teach chemical transformation of contaminants, one skilled in the art would not apply the conditions described by Wu to the process of Somekh. Somekh requires high energy to accomplish its purpose, *i.e.*, chemical transformation of deposited carbon into a gas. There is no indication that the temperatures disclosed by Wu can be used in the Somekh process to chemically transform deposited carbon into a gas.

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[1] At best, one skilled in the art might be motivated to use the Wu process to reduce contaminants in an imaging system prior to using the Somekh process to remove carbon deposits from an imaging chamber, but there is no teaching, suggestion, or motivation that the individual steps of the two methods (*e.g.*, temperature conditions) can or should be combined to produce a single process for removing carbon deposits by chemical transformation to a gas.

The teachings of the other secondary references do not remedy the deficiencies of Somekh and Wu and therefore do not render the claims obvious. For example, neither Van Schaik, Alvarez, nor Spiegelman teach or suggest "contacting at least a portion of the substrate with the purified purge gas at a temperature of about 20°C to about 100°C" as stated in amended Claims 1 and 12. Furthermore, like Somekh, these references do not teach or suggest a purified purge gas having a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons and contacting at least a portion of a substrate with the purified purge gas.

Therefore, Claims 1-5, 8-15, and 18-26 are patentable in light of the cited references, alone or in combination.

Amended Claim 27 is also non-obvious over Somekh in view of either Alvarez or Spielgelman. As discussed above, Somekh does not teach: (1) "contacting at least a portion of the wafer with the purified purge gas under temperature that does not change the AMC"; or (2) "producing a contaminated purge gas by *transferring* AMC from the wafer into the purified purge gas" (emphasis added), as stated in Amended Claim 27. Neither Alvarez nor Spiegelman teach or suggest this subject matter. Since neither Alvarez nor Spiegelman remedy the deficiencies of Somekh, Claim 27 is patentable over these references.

New Claims 28-38 are also patentable over the cited references. For example, none of the references, alone or in combination, teach or suggest a method for the removal of airborne molecular contaminants (AMC) from a AMC contaminated substrate, comprising: contacting at least a portion of the AMC contaminated substrate with a purified purge gas consisting essentially of extra clean dry air, at a temperature of about 20°C to about 100°C; producing a contaminated purge gas by transferring AMC from the substrate into the purified purge gas, the contaminated purge gas including AMC from the substrate; and removing the contaminated purge gas from the substrate; thereby removing AMC from the substrate, as stated in new Claim 32.

Double Patenting

The Office Action stated that Claims 1-5, 8-11, 12-15, 18-19, 21 and 23 of the present application are provisionally rejected under the judicially created doctrine of obviousness-type double patenting in light of particular claims of U.S. Application No. 10/683,904 (now U.S. Patent No. 6,913,654) or U.S. Application No. 11/113,726 and either Somekh, Wu, Alvarez, Spiegelman, Van Schaik, or combinations thereof.

The claims are not obvious because the suggested combinations do not teach or suggest the pending claims of the present application. As discussed above, Somekh, Wu, Alvarez, Spiegelman, Van Schaik, alone or in a combination, provide no teaching or suggestion of "contacting at least a portion of the substrate with the purified purge gas at a temperature of about 20°C to about 100°C" as stated in amended Claims 1 and 12. The references also do not teach or suggest a purified purge gas having a contaminant concentration of less than about 1 part per billion (ppb) on a volume basis of at least one of the contaminants selected from the group consisting of sulfur oxides, nitrogen oxides, Si-containing organics, organophosphates, amines, volatile bases, volatile acids, refractory compounds, volatile metal compounds, and non-methane hydrocarbons and contacting at least a portion of a substrate with the purified purge gas, as also stated in amended independent Claims 1 and 12. The references also do not teach or suggest (1) "contacting at least a portion of the wafer with the purified purge gas under temperature that does not change the AMC"; or (2) "producing a contaminated purge gas by *transferring* AMC from the wafer into the purified purge gas" (emphasis added), as stated in Amended Claim 27.

Further, combining any of these references with any of the claims of U.S. Application No. 10/683,904 or 11/113,726 does not suggest the subject matter of the pending claims.

In light of the foregoing arguments, Applicants request removal of the provisional rejection under the judicially created doctrine of obviousness-type double patenting.

Information Disclosure Statements

Applicants filed a Supplemental Information Disclosure Statement on August 1, 2005, but have not received an acknowledgement copy of the PTO-1449 form. Applicants respectfully request that the Examiner consider the references cited and provide an initialed copy of the PTO-1449 form in the next correspondence.

In addition, Applicants are submitting an additional Supplemental Information Disclosure Statement herewith. Applicants request that the Examiner consider the reference cited in this new IDS.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner believes that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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